matique" (1736). He was a very active observer at the Paris Observatory from 1666 to 1682, and his observations, which were chiefly made with a 9-ft. quadrant, were finally printed in Le Monnier's "Histoire Céleste" (1741). Though his work was less showy than that of his colleague Cassini, Picard deserves an honourable place in the ranks of astronomers as one of the comparatively few observers with instruments of precision in the period between Tycho Brahe and Flamsteed, and as the pioneer in the application of the telescope to this work.

Robin's Water-music.

By PROF. W. GARSTANG.

SCARCE heard amid the choral throng
That gave the Spring its greeting,
You triumph, Robin, when your song
Marks Summer's joys retreating;
Then, while the green leaves flame to gold,
And rain drips o'er their embers,
You raise, above the sodden mould,
The song of all Septembers.

Erratic, wistful, sweet and shrill,
The grave and gay you mingle,
As changeful as the trickling rill
That voices glade and dingle,—
From high to low,
Now swift, now slow,
Like water o'er the pebbles,
Meandering here,
And darting there,
To sparkle in the trebles.

Chir′ri-tew! Ir′ri-tew!
Wis′-yoo, Wis′-yoo!
Wee′!—Swee′!—Tew-ay′!
Tew, tew′, tew, Psee′!
Chirri-wee′! Tyo-to′!
Se-Wis′sy-wissy, Wis′sy-wissy, Wee′!

Until, in soft soliloquy,
You enter realms more tender,
And drop, from heights of ecstasy,
A falling trail of splendour,—
Brilliant gems no casket treasures,
Crystal tones no music measures,—
A glittering, flickering, tinkling streamlet,
Fragile as a dream.

See, See′, See, TSEE′. . . !
Choo-it′ty, Tu-it′ty, Choo-it′ty, Tu-it′ty, Choo-ee′!
Wee-chee′! Wee-tsee′ . . . !
Che-wir′rio-ir′rio-wir′rio-ir′rio-ee′!
As rockets soar
Aloft to fall in twinkling disarray,
As fountains pour
To break adrift in showers of glistering spray.

* * *

Tit-it′! Tit-it-it-it′! Tit′! Tit′!
Yes, Robin, yes! I must admit
(*Tit-it′-it-it′! Tit-it′-it-it′!*)
My actions were suspicious,—
For no true gardener stops his spade
To hear a little bird's cascade
Of music, though delicious!
But when, enraptured, down the scale
You dance by steps so slender,
The Nightingale's *Tyo-tyo′-tyo-tew′*,
The Throstle's *Tirra-lirra-loo*,
Grow pale
Before your rich chromatic splendour!

Notes.

THE following is a list of those recommended by the president and council of the Royal Society for election to the council at the anniversay meeting on November 30:—*President:* Prof. C. S. Sherrington. *Treasurer:* Sir David Prain. *Secretaries:* Mr. W. B. Hardy and Mr. J. H. Jeans. *Foreign Secretary:* Sir Arthur Schuster. *Other Members of Council:* Mr. J. Barcroft, Sir William Bragg, Dr. A. W. Crossley, Prof. J. B. Farmer, Sir Walter Fletcher, Prof. A. Fowler, Dr. A. C. Haddon, Sir Robert Hadfield, Sir Thomas Heath, Prof. J. Graham Kerr, Prof. H. Lamb, Sir William Leishman, Dr. S. H. C. Martin, Prof. J. W. Nicholson, Mr. R. D. Oldham, and Prof. W. P. Wynne. Prof. Sherrington, who is to succeed Sir Joseph Thomson as president, is the Waynflete professor of physiology in the University of Oxford, and was formerly professor of physiology in the University of Liverpool and Fullerian professor of physiology at the Royal Institution. He was elected F.R.S. in 1893, and was awarded a Royal medal in 1905 for his researches on the central nervous system.

DR. E. H. GRIFFITHS has been elected general treasurer of the British Association in succession to the late Prof. John Perry. The council of the Association has agreed to the formation of a separate Section of Psychology, as recommended by the Sections of Physiology and Educational Science at Cardiff, and approved by the general committee. Consideration of the number and scope of the various Sections is to be referred to a special committee. It has been decided to invite national Associations for the Advancement of Science to send representatives to annual meetings of the British Association in future.

THE council of the British Association has recently had before it the suggestion made by Prof. Herdman in his presidential address at Cardiff for a new *Challenger* expedition for the exploration of the great oceans of the globe with modern instruments and methods. It will be remembered that this proposal received the support of all the Sections of the Association by formal resolution, and the council was asked to appoint a committee to take the necessary steps to urge its need upon the Government and the nation. This committee has now been appointed, and the scientific world will follow its activities and their result with close attention. An oceanographical expedition along the lines contemplated, and equipped with the instruments which modern science can provide, would lead to a great increase of knowledge both for scientific study and for profitable development, and no nation could carry it out more appropriately than Great Britain in co-operation with our overseas Dominions. There will be an eclipse of the sun in September, 1922, with the line of totality crossing the Maldive Islands, and the expedition could very well include an astronomical party to observe it. It is believed that the Admiralty is favourably disposed towards the scheme, and every scientific man hopes that the necessary support will be forthcoming to carry out the enterprise on a scale worthy of the British Empire.

MR. H. G. WELLS, who has recently been in Russia, describes in the *Sunday Express* of November 7 the position of some leading men of science whom he met at Petersburg, by which name, and not Petrograd, this city is now called. He saw Pavlov, the physiologist, Karpinsky, the geologist, Belopolsky, the astronomer, Oldenburg, the Orientalist, and Radlov, the ethnologist, among others who have survived the complete social disruption which Russia has undergone since the catastrophe of 1917–18. Such privileges as are possible in the country under existing conditions appear to be extended to scientific workers; for Mr. Wells mentions that the ancient palace of the Archduchess Marie Pavlova is now a House of Science, where a special rationing system "provides as well as it can for the needs of four thousand scientific workers and their dependents—in all, perhaps, for ten thousand people." In spite of this, however, there are much privation and misery, and unless food and clothing are provided few are likely to survive the coming winter. What struck Mr. Wells more than anything else was that even under the present disordered conditions, and with physical vitality reduced almost to its lowest limits, a certain amount of scientific work is still carried on, and there is a burning desire to know what has been done for the advancement of natural knowledge in other parts of the world since the Russian collapse. "The House of Literature and Art," we are told, "talked of want and miseries, but not the scientific men. What they were all keen about was the possibility of getting scientific publications; they value knowledge more than bread." There would, we are sure, be no difficulty in obtaining the books and publications needed by, or funds for providing warm clothing for, the great survivors of the Russian scientific world, if their colleagues here were assured that the parcels would reach their destination. This specific aid is, however, a different matter from general provision for the physical and mental needs of the "four thousand" scientific workers to whom Mr. Wells refers. We should scarcely have placed so many men in that category even before the war, and the ranks of scientific forces in Russia must have been greatly reduced by the revolution.

A GOOD deal of uneasiness has recently been manifested with regard to the free importation of German dyes into this country, and in reply to questions on this subject the President of the Board of Trade stated on November 1 in the House of Commons that proposals to protect the industry for a time, so as to enable it to be placed on a secure foundation, will be embodied in a Bill relating to key industries which will be introduced and proceeded with as soon as possible. It appears that during the first nine months of this year 1574 tons of dyes were imported from Germany, of which 877 were consigned under the reparation clauses of the Peace Treaty. The value of the whole quantity was 1,399,027*l.*, and as the average price per lb. is thus about 7*s.* 11*d.* it would not appear that there can be any question of dumping as alleged in some quarters. The amount imported is at the rate of about 2000 tons per annum, whilst in 1913 there were imported from Germany about 13,000 tons. It is evident that there is a demand in this country for certain dyes of German origin, and this is not surprising when it is considered that with one conspicuous exception British manufacturers at the commencement of the war, like the Americans, concentrated their attention on the production of those dyes which were most in demand, simple to make, and required readily obtainable intermediate products. It is high time, however, that a serious effort should be made to produce such important dyes as the rhodamines and others, for which special plant and intermediate products not easy to make are required; and it may be noted that the former, in consequence of the remarkable discovery of a new catalytic method of preparing phthalic anhydride at a very low cost, are already appearing in America. Until this can be done the introduction of legislation such as that foreshadowed by the President of the Board of Trade is quite essential.

IN view of the increasing population in England and the imperative necessity that this country should in the future be more self-supporting in the matter of food than in the past, few subjects are of more vital importance than that of the reclamation of waste lands. The Association of Economic Biologists, presided over by Sir David Prain, discussed this problem at its meeting in the Imperial College of Science on Friday, November 5. In addresses very fully illustrated by lantern-slides Prof. F. W. Oliver considered the question of reclamation by botanical means and Dr. E. J. Russell that of reclamation by agricultural means. The former devoted his attention primarily to the reclamation of salt marshes and other maritime tracts, showing the manner in which this process slowly occurs in Nature through the accreting activities of certain ordered successions of plants, and then indicating how such action might be accelerated and made of immediate practical value by the wise interference of skilled botanists. Knowledge of the ecology of maritime-strand plants is, however, very small, and the necessity was emphasised for the establishment of experimental stations where such problems could be studied. Dr. Russell considered the reclamation of inland tracts of country, such as moor and fen, sandy commons, etc., and lands deficient in particular mineral constituents. Each class of waste land was discussed in turn with illustrations drawn from a wealth of personal experience, and the different procedures required in the several cases were described. Prof. Farmer, Dr. Voelcker, Mr. Lobjoit, Dr. Salisbury, Mr. Bernard Davis, and Sir David Prain took part in the discussion.

"OUR Wasteful Use of Coal and a Remedy" is the title of an article by Mr. W. O. Horsnaill appearing in the November issue of the *Fortnightly Review.* The author discusses in turn various recent publications, and concludes that "it is quite evident from the foregoing facts that coal should never be burnt direct for the production of heat if the greatest economy in its use is to be realised." He mentions the proposals made by Dr. Ferranti in 1910, according to which all coal would be consumed centrally for the generation of electricity, and points out once more the fundamental weakness of any such proposal, viz. that any attempt to deal with heating by such a scheme would mean an extravagant expenditure of fuel. The author finds that "the recommendations of the Coal Conservation Sub-Committee which was appointed by the Reconstruction Committee closely accord with the suggestions made" in his article, and goes on: "Put briefly, the Sub-Committee recommendations comprise the establishment of sixteen super-electric generating stations for supplying the whole country and the gradual suppression of the existing 600 undertakings. At these stations the coal would be so treated as to extract the tar, sulphate of ammonia, and gas, the latter, together with the coke, being utilised to produce the electricity. So far as practicable, the super-stations would be established near the coal-pits." There is a lack of precision about this paragraph which is observable in other parts of the article. The soundness of treating coal for by-products at the proposed super-stations was regarded by the Sub-Committee as requiring consideration. Moreover, the position of modern super-stations is of necessity determined by supplies of condenser water, and not by proximity to coal-pits. Mr. Horsnaill concludes: "Whether the use of electricity for heating and cooking is contemplated is not clear, but, in view of heavy losses already set forth as accruing from this practice, it is to be hoped that coke and gas will be employed for these purposes"—with which surely anybody who has looked into the subject at all carefully will agree.

WE are glad to welcome a new contemporary in the *Mining Electrical Engineer,* of which the first issue is now before us. This publication is the official journal of the Association of Mining Electrical Engineers, a society which has been doing important work for the last eleven years in the spreading of knowledge regarding the use of electricity in mines. Such a journal is of particular interest at the present time, when the need for the application of scientific methods to the aid of labour in improving the output of the coal-mines is so urgent, and we are pleased to see this sign of vitality in a society which from its earliest days has worked hard to break down prejudice against the use of electricity in collieries, to facilitate the interchange of experience, and to encourage those researches which conduced so much to improved safety and trustworthiness in this field. Besides some sound common sense regarding the industrial situation, there are several interesting technical articles, including a discussion of the ventilation of enclosed motors by Mr. W. M. Landon, and a fully illustrated description of an electrically driven main shaft winding plant, employing a geared three-phase motor. A complete system of electrical signalling in collieries, worked out in great detail by one of the well-known electrical firms, is also described. The proceedings of the various branches of the association are recorded, and many interesting notes on matters of electrical interest appear.

THE October issue of the *Scientific Worker*—the official organ of the National Union of Scientific Workers—contains the report of the Executive Committee on the policy and administration of the Government Department of Scientific and Industrial Research. After describing the present regulation for the formation of research associations under the Department, the report condemns the policy of assisting these close corporations with public funds, and would substitute for them the universities, colleges, and other national institutions at which research has been carried out so satisfactorily in the past. The report alleges that the faults of the present arrangements are due mainly to the constitution of the Advisory Council of the Research Department and to the absence of members with first-hand knowledge of the working of modern faculties of applied science at our universities and colleges. It is held that scientific eminence should not be the only qualification for membership of the Advisory Council, but aptitude for the conduct of affairs should be essential. These questions are to be discussed at the meeting of the council of the union on November 13.

PROF. F. GOWLAND HOPKINS is to deliver the eleventh biennial Huxley lecture on "Recent Advances in Science in their Relation to Practical Medicine" at Charing Cross Hospital at 3 o'clock on Wednesday, November 24.

DURING the coming session the meetings of the Röntgen Society will be held in the physics lecture theatre, University College, Gower Street, W.C.1, on the Thursday before the third Friday of each month at 8.15 p.m.

THE opening meeting of the new session of the Institution of Electrical Engineers will be held on Thursday, November 18, and not to-day (November 11), as originally announced, at the Institution of Civil Engineers at 6 p.m., when the president, Mr. Ll. B. Atkinson, will deliver his inaugural address.

THE Eugenics Education Society is organising a lecture to be given by Dean Inge on Tuesday, November 16, at 5.30 p.m., at the Wigmore Hall, Wigmore Street, W.1, entitled "Eugenics and Religion." The lecture will be free and open to the public.

THE annual Huxley memorial lecture of the Royal Anthropological Institute will be delivered by Dr. A. C. Haddon in the lecture-room of the Royal Society on Tuesday, November 23, at 8.30. The subject will be "Migrations of Cultures in British New Guinea."

THE New York correspondent of the *Times* states that the fifth quinquennial election to the American Hall of Fame has resulted in the choice, from among 177 names submitted, of six, which include James Buchanan Eads, a famous engineer, and William Thomas Greene Morton, the Boston dentist who introduced sulphuric ether as an anæsthetic. Of the 27 women nominated, one, Alice Freeman Palmer, the educationist, was chosen.

THE following have been elected officers of the Cambridge Philosophical Society for the session 1920–21:—*President:* Prof. Seward. *Vice-Presidents:* Sir E. Rutherford, Mr. C. T. R. Wilson, and Dr. E. H. Griffiths. *Treasurer:* Prof. Hobson. *Secretaries:* Mr. H. H. Brindley, Prof. Baker, and Mr. F. W. Aston. *New Members of the Council:* Prof. Marr, Mr. C. T. Heycock, Mr. H. Lamb, Prof. Hopkins, Dr. Bennett, and Dr. Hartridge.

MR. ARTHUR MACDONALD has reprinted from the *Medical Times* of July last an interesting paper on "The Anthropology of Modern Civilised Man." He describes the conclusions at which he has arrived after a long course of study. He dwells upon the importance of head measurements as a test of mental ability. The smaller circumference of the head among children of mixed nationalities in America is held to indicate an unfavourable result of race intermixture. One of the main objects of the study of humanity is to lessen pain through the knowledge gained by the study of pain itself. Investigations into sensibility give some interesting results. Coloured children are more sensitive to heat than white children, and bright children as compared with dull children. All children are more sensitive to heat and locality on the left than on the right wrist, probably because the greater use of the right hand causes obtuseness of feeling. Girls are less sensitive to heat and more sensitive to locality on the wrist than boys, and all children are more sensitive to heat and locality on the wrist before than after puberty.

IN the issue of *Man* for October Mr. L. W. G. Malcolm describes a settlement of Tasmanian half-castes on Cape Barren Island, included in the Furneaux group of islands in Bass Strait, between Tasmania and the Australian continent. The settlement dates from the latter half of the seventeenth century, when Bass demonstrated that Furneaux Land was a group of islands, and not, as was generally supposed, connected with the mainland. The sealers who visited it carried off aboriginal women from Tasmania, and from them the present population has sprung. Among them Mr. Malcolm found two old men who claimed descent from aboriginal Tasmanian mothers. There were only nine families on the island, comprising in all about one hundred persons. One noticeable fact about these people is the pronounced odour of their bodies, which was decidedly fishy owing to the character of their diet. Their chief industry is catching and salting mutton-birds, which are exported in casks to the mainland. The Government provides medical attendance, and a school has been established. This survival of half-castes derived from a race now extinct is of considerable interest to anthropologists.

THE *Museums Journal* for November contains a useful history of the Winchester City and Westgate Museums by Mr. R. W. Hooley, who as honorary curator has of late been devoting much time and labour to putting the collections in order. In the course of his inquiries Mr. Hooley has made the lamentable discovery that the original bushel measure deposited in the city by King Edgar, and still in its possession only fifty years ago, is now missing.

IT is an excellent custom of the Smithsonian Institution to print as an appendix to its annual report a selection of papers covering a wide range of sciences and each of some general interest. The volume for 1917, recently received, devotes 546 pages and 242 plates to twenty such papers, of which eleven are original. Except for one original memoir and two of the reprints, all are by American authors, and about half deal with American subjects. It is scarcely possible to abstract such an assemblage, but we would direct the special attention of British readers to two of the papers—in the first place to "The Correlation of the Quaternary Deposits of the British Isles with those of the Continent of Europe," a hundred-page memoir by Mr. C. E. P. Brooks. This does not reveal a first-hand acquaintance with the deposits, but it is a most useful summary of the voluminous literature. Dr. T. Wayland Vaughan has an intimate knowledge of "Corals and the Formation of Coral-reefs," and his paper should interest the countrymen of Darwin, whose atoll hypothesis Dr. Vaughan is unable to substantiate in fact. The advocates of a new *Challenger* expedition may note his conclusion that "further investigations of the phenomena associated with coral-reefs are among the pressing desiderata of geologic research."

AN account of the round-headed apple-tree borer (*Saperda candida*) and its control is given in Bulletin 847 (1920) of the U.S. Bureau of Entomology. This insect is a Longicorn beetle which is indigenous to the United States and Canada. Its larva bores into the bark and wood of apple, pear, and quince, thus causing a great deal of injury. Certain wild trees are also affected, including crab, hawthorn, mountain ash, etc. The complete life-cycle of the insect occupies, as a rule, two years, but the developmental period may be lengthened or shortened according to locality and other factors. No easier and cheaper method of control was found than the old method of removing the larvæ from the trees with the aid of a pocket-knife, a narrow chisel, and a piece of wire. It is claimed that two men, on an average, with an insignificant expenditure for tools and materials, should be able to "worm" 500 trees per diem. Ordinary white-lead paint is a cheap and effective method for preventing the females from ovipositing on the bark.

THE important question of the control of the cotton-boll weevil by means of poison is dealt with by Messrs. B. R. Coad and T. P. Cassidy in Bulletin 857 (1920) of the U.S. Bureau of Entomology. Extermination of the species is not attempted, the result aimed at being a sufficient reduction of the weevil infestation to permit of the production of a full cotton crop. About 60 per cent. of the squares which appear on the cotton plant fail to mature as bolls, and are normally shed at some time during their development. It has been found that up to a certain point the first shedding due to boll-weevil attack merely takes the place of this perfectly normal shedding, which would be encountered even if the weevils were absent. The system of poisoning advocated is intended to keep the weevils controlled to such a degree that they will not be able to do more than offset the above-mentioned shedding. The authors advise dusting the plants with calcium arsenate at the rate of 5 lb. per acre. In order to avoid injury to the foliage the powder should not contain more than 0·75 per cent. of water-soluble arsenic oxide. It appears safe to assume that, with fertile soil and a fairly severe weevil infestation, average gains of 500 lb. or more of seed cotton per acre may be expected from the treatment advocated.

WE have received a copy of the Mauritius Almanac for 1920, published by the Mauritius Stationery and Printing Co. It is a large volume containing a mass of statistical and descriptive matter on all aspects of the life of the colony. The account of the agriculture is particularly full and interesting. There is a general map of the whole island, and another showing the distribution of rainfall.

THE results of some oceanographical researches on the coast of South-West Africa are published by the Deutsche Seewarte in *Archiv*, No. 1, vol. xxxviii., the first part of this publication which has appeared since 1915. The work, which was carried out by the *Möwe* so long ago as October, 1911, to July, 1912, includes the investigation of depths and sea temperatures along the coast between the Orange and Kunene Rivers seawards as far as the 200-metre contour. The results are discussed by Dr. A. Franz, and include charts of the depths, water, and air-temperatures. There is also a section dealing with the distribution of pressure and winds. The work is particularly interesting in relation to variation in the strength and temperature of the Benguela current.

THE degree of inaccessibility of various parts of the Arctic regions has a direct bearing on future exploration. Mr. V. Stefansson has an article on this subject, accompanied by a map, in the September issue of the *Geographical Review* (vol. ix., No. 9). By measuring distances of 500 miles northward along the meridians from the more northerly points attained by various exploring ships, an area of comparative inaccessibility is found to remain. The distance of 500 miles is chosen, on the basis of Peary's journey from Cape Columbia to the Pole, as a fair maximum possible with dog-teams from the base of supplies. By these estimates the "pole of inaccessibility" is found to be at latitude 83° 50′ N., longitude 160° W. Various modifying factors must be borne in mind. Open leads or heavy pressure ridges are great impediments to sledge travelling in several parts of the Arctic basin, while the action of currents may nullify advance or, if known and taken advantage of, may greatly facilitate progress. The question of food supply, if the traveller is "living off the country," also influences the problem. Certain areas of Arctic ice are known to be almost devoid of seals. These deserts must be avoided or crossed hurriedly. But Mr. Stefansson believes that the well-known drift across the Pole carries to this region, least accessible to man, a certain number of seals from the Beaufort Sea, where they are abundant.

As previously recorded in NATURE (August 23, 1917, p. 510), certain plant remains found in the wide tract of sandstones and conglomerates on the west coast of Norway led Nathorst to assign those rocks to the Middle Devonian. Some fish remains found since, and now described by Dr. Johan Kiaer (*Bergens Museums Aarbok*, 1917–18, 2 Hefte, 1920), fully confirm this conclusion, and, though incapable of specific determination, warrant a comparison of the Norwegian rocks with the upper part of the great Orcadian group as displayed in the north of Scotland, and particularly in the more closely adjacent Shetlands. There were at least two kinds of ganoid fishes (apparently Diplopterus and Tristichopterus) existing in large numbers, and, whether they fed on other fishes or not, their presence implies the existence of a large animal and plant life for their maintenance. Some of the plants are regarded by Nathorst as aquatic, and tracks of some crustacean have been observed. The present discoveries will doubtless lead to further investigation of these rather inaccessible Devonian regions, and we may hope that remains of other animals will before long be found.

PARTS 1 and 2 of vol. vi. of the Proceedings of the Indian Association of Science contain together eight papers which extend to 112 pages. Although the papers cover most branches of physics, investigations connected with the behaviour of musical instruments are most popular. Amongst these one by Prof. Raman on the variation of the bowing pressure with the pitch of the note, with the part of the string bowed, and with the speed of bowing in a violin may be noted. The observations were made with a violin moved mechanically to and fro at a constant speed over an iron track, while above it was suspended a bow in a balanced frame which allowed the pressure on the string to be varied. If the position of the point bowed is changed, the bowing pressure must vary inversely as the square of the distance of the point from the bridge. If the speed of bowing is increased, the pressure must be increased, at first slowly, then more rapidly. If the pitch of the string is changed by stopping, the pressure varies with the frequency, and is a maximum at each of the resonance frequencies of the string.

In the course of his presidential address to the North-East Coast Institution of Engineers and Shipbuilders, delivered on October 29, Mr. A. Ernest Doxford made reference to the educational functions of the institution. The promotion and maintenance of professional proficiency are among the chief duties accepted by the technical societies. Their policy is to increase the professional knowledge of their members by fostering the interchange of useful information by the members themselves, and there would seem to be no more useful method of attaining the end in view than that of the reading and discussion of thoroughly good papers. In the more scrupulous institutions no paper appears except from the pen of a practical expert, and the information provided has to be either quite new or sufficiently up-to-date to require further dissemination and discussion. If the engineering technical societies are truly representative of engineers in the particular territory to which they refer, they represent the only people who are able to provide new information on engineering questions, and it is the self-imposed responsibility of these societies to furnish such information. Strictly speaking, a society cannot *train*; it only finds the information with which its members must instruct themselves. Mr. Doxford puts the question as to whether the technical societies do, or can, fill a place in the educational system of this country, and considers that they are unique and indispensable factors in any complete national educational system. The institution is not endowed, and Mr. Doxford considers that the members, the local engineering and shipbuilding industries, and the shipowning businesses might find some opportunity of encouraging it by contributions to an endowment fund; he does not think that the institution should appeal to the State, particularly in these times when State generosity in some directions has become dangerous.

We have received from Messrs. Dulau and Co., Ltd., of Margaret Street, Oxford Circus, W.1, two catalogues of books which they are offering for sale. One includes a number of old French and Italian books and a collection of some seventy volumes from the library of Adam Smith. There are also four volumes which belonged to Newton, two of which contain his autograph. The other catalogue contains a list of about one thousand books on mathematical and physical sciences, many of them very old copies. Among other important items we note that one set of the thirteen volumes in which the Paris Académie des Sciences published the works of Laplace is offered for sale. There are also some early works on sundials and a number of sets of the Proceedings of various British and American scientific societies and other scientific periodicals.

Our Astronomical Column.

The Distribution of the Stars in Space.—The *Astrophysical Journal* for July contains an important paper by Prof. Kapteyn and P. J. Van Rhijn on star-density in different regions of the stellar system. The authors have lately accumulated from various sources much new material on star parallaxes and motions, and state that they could not resist the temptation to attempt a general solution of the problem of the universe, though they admit that it will need revision. They adopt the parsec as unit of distance, and the magnitude at unit distance as absolute magnitude. That of the sun is $-0{\cdot}2$, while the median magnitude of all stars is $+2{\cdot}7$. The expression for the logarithm of the number of stars of absolute magnitude M per 1000 cubic parsecs in the region near the sun is found to be $-2{\cdot}394+0{\cdot}1858\,M-0{\cdot}0345\,M^2$, indicating a parabolic curve when M is taken as abscissa. This gives 0·0451 stars per cubic parsec near the sun, or 23·6 within 5 parsecs of the sun. Observation gives some twenty-seven stars in this sphere—a satisfactory agreement.

The next step is to investigate the rapidity with which the stellar density falls off with increasing distance from the sun (provisionally assumed as the centre). Curves are drawn showing the lines of various densities on a plane drawn through the galactic polar axis. For example, the line of density 0·01 (the density near the sun being unity) is distant 1300 parsecs towards the galactic poles, and 8900 parsecs in the galactic plane. Density 0·063 is reached at about half these distances.

Prof. Kapteyn has re-investigated the formula connecting parallax and proper motion. The new formula is

$$\log \pi_{m,\mu} = -0{\cdot}690 - 0{\cdot}0713m + 0{\cdot}645 \log \mu,$$

m being the apparent magnitude and μ the annual proper motion in seconds.

The Multiple System ξ Ursæ Majoris.—Dr. G. Abetti contributes a study of this system to *Mem. della Soc. degli Spett. Ital.* (vol. viii., Ott., Nov., Dic., 1919). He reminds us that it was this star which Sir W. Herschel, who discovered its duplicity in 17·0, used to demonstrate the extension of the law of gravitation beyond our system. On plotting the numerous observations of the last sixty years a minor oscillation clearly appears superposed on the orbital motion. This was explained by the discovery made by Wright and Campbell at the Lick Observatory in 1900 and 1908 that each star of the visible pair is a spectroscopic binary. The period of the pair A, *a* is 1·82 years, and their respective masses are given as 0·52 and 0·16 of the sun. The joint mass of B, *b* is given as 0·49 of the sun, but there is scarcely enough material to assign the respective masses of B, *b*. The parallax of the system is assumed to be 0·156″. If the mass of *a* is correct, this is about equal to the companion of Krueger 60, these being the smallest stellar masses known.

Charlier's Critical Surface in Orbit Determination.—Prof. Charlier showed that a certain surface divides those regions in space where there is a dual solution of the orbit problem from three observations from those where there is only one. Herr A. Wilkens gives in *Astr. Nach.*, 5067, tables for laying out this surface accurately. It suffices to give the intersection with the plane of the ecliptic, the surface being one of revolution about the earth-sun line. The curve resembles a looped *limaçon*, the double point being at the earth, the inner loop extending to the sun, and the outer one to a point 1·7844 beyond the sun on the earth-sun line produced. The table includes some other auxiliary quantities of use to orbit computers.